

The Introduced Semelid Bivalve *Theora (Endopleura) lubrica* in Bays of Southern California

BY

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(2 Text figures)

DURING A SURVEY of the subtidal soft bottoms of the Lower Newport Bay, California, three Ekman-Birge Grab samples were collected on 14 July 1971 from a depth of 4 m in the Main Channel area adjacent to the Balboa Peninsula (Figure 1). The samples contained a total of 363 specimens of an unusual species of bivalve that could not be identified at the time. The three samples were subsequently combined and set aside for future reference. During June 1973 I sent several specimens to Dr. Eugene Coan for identification. He determined that the species was *Theora (Endopleura) lubrica* (Gould, 1861) and informed me that this represented the second record of the species on the Pacific Coast of the United States. It was first collected from Sunset Bay, California (Figure 1) during a benthic survey by the California Department of Fish and Game (HARDY, 1970). This record was cited by COAN (1973: 325) in a review of the Northwest American Semelidae. HARDY (1970: 22) considered that the introduction of *T. lubrica* to Sunset Bay probably occurred by U. S. Navy ships which frequent Anaheim Bay (Figure 1). The species has been previously reported (Habe and Ito, 1965) from Indonesia, Thailand, China, the Philippines and Japan (including Kiushu, Shikoku, Honshu, southwestern Hokkaido) in mud bottoms of the inner portions of bays.

On 6 July 1973 I resampled the area in the Main Channel of Lower Newport Bay. Thirteen samples were collected from the soft bottom, which could be described as a mixed substrate, having coarse silts (0.06 to 0.03 mm) as the predominant size fraction. Only three specimens of *Theora lubrica* were collected (each from a separate sample), indicating a mean density of 6.1 individuals per m². In a benthic survey of the Balboa Channel (Figure 1) by Marine Biological Consultants (1972a), *T. lubrica* (referred to as "*?Siliqua* sp. A") was collected at 3 of 6 stations. The mean density of 9.3 individuals per m² for the Balboa Channel area during September 1972 is com-

parable with the mean density of 6.1 specimens per m² for the Main Channel in July 1973 (Table 1).

Additional records for *Theora lubrica* (Table 1) were obtained by Marine Biological Consultants (1972b, 1973) from Sunset Bay (Huntington Harbour) and the Los Angeles Harbor (Figure 1). The low mean density value of 4.0 individuals per m² for *T. lubrica* (referred to as "*Siliqua* sp.") from Sunset Bay during August 1972 suggests a decrease in the population since the survey by HARDY (1970) in 1968–1969. High numbers of *T. lubrica* (referred to as "*?Tellinidae* B, unident.") were recorded from Slip 5 in the East Basin Channel of Los Angeles Harbor. One would expect that the species is established in other parts of Los Angeles Harbor, and possibly in Long Beach Harbor and Alamitos Bay. The present records for *T. lubrica* summarized in Table 1 suggest that the species is established at low population densities in at least 3 bays in Southern California. The very high mean density of 1,384 individuals per m² for the Main Channel of Lower Newport Bay in July 1971 could represent a period of time during which an unusually successful repopulation of the area had occurred.

The following description of *Theora lubrica* is provided to aid in species identification. The majority of specimens examined from Newport Bay, Sunset Bay and Los Angeles Harbor ranged from about 6 to 10 mm in length. The largest specimen measured 12.8 mm and was collected from Los Angeles Harbor. Externally, the valves are smooth and shiny with fine concentric ribbing, and the periostracum is not evident. The valves gape slightly at the anterior and posterior ends. An internal rib, extending from a point just anterior of the beaks toward the antero-ventral margin, is normally evident externally through the thin, translucent valves. The most prominent internal features of the valves (Figure 2) include the ribs directed antero-ventrally in each valve, a small and bulbous resilium and the bifid cardinal tooth in the left valve.

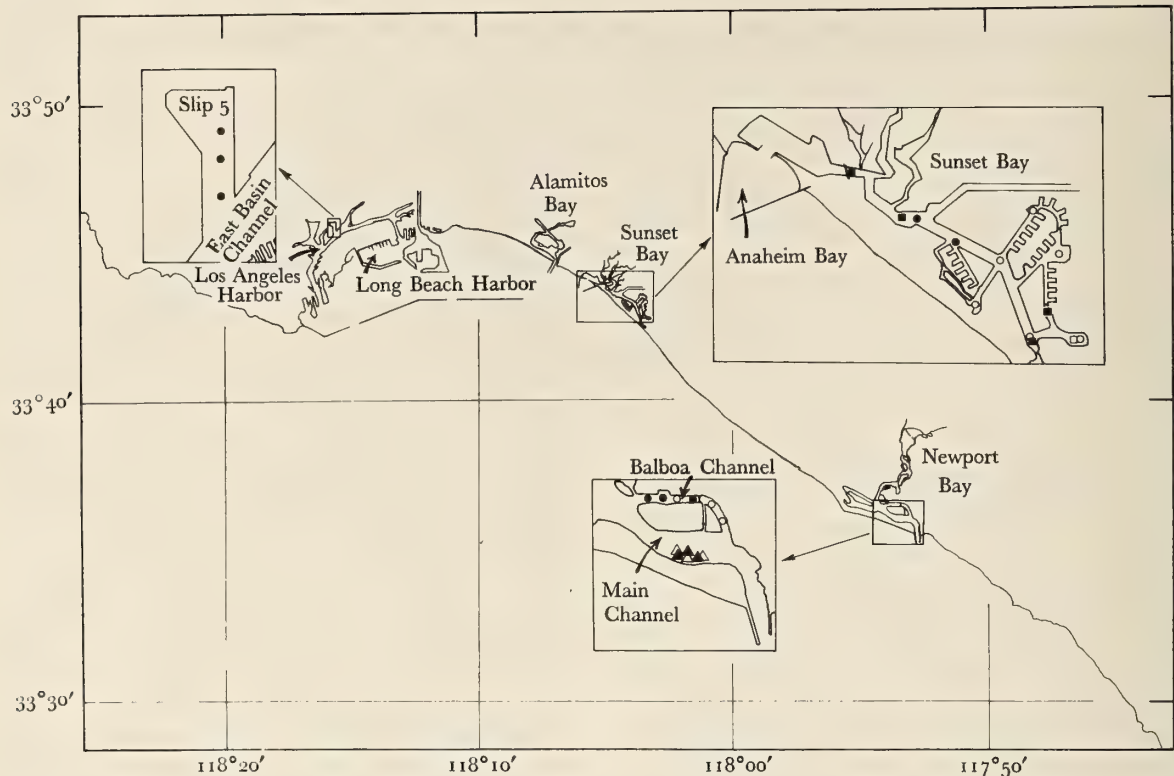


Figure 1

Station locations for benthic studies in Los Angeles Harbor, Sunset Bay, and Lower Newport Bay. Stations occupied by Marine Biological Consultants in Los Angeles Harbor, Sunset Bay, and Balboa Channel of Lower Newport Bay are indicated by circles. Station locations in Sunset Bay for the Fish and Game study (HARDY, 1970) are indicated by squares. Stations occupied by Seapy in Main Channel, Lower Newport Bay are indicated by triangles. Solid symbols represent stations at which *Theora lubrica* was collected, while open symbols represent negative stations.

Specimens of *Theora lubrica* from the July 1971 collection have been sent to the California Academy of Sciences, Stanford University and the Los Angeles County Museum of Natural History. A set of specimens has been deposited in the Museum of Systematic Biology, University of California, Irvine.

ACKNOWLEDGMENTS

Appreciation is expressed to Mr. Ronald Rathburn for collection of the grab samples from Lower Newport Bay during July 1971; to Dr. Eugene Coan for reviewing the manuscript and providing preliminary sketches of the in-

terior of the valves; to Mrs. Margaret Mooney for translation of the section of Habe and Ito (1965) concerned with *Theora lubrica*; and to Marine Biological Consultants, Costa Mesa, California, for their assistance and the loan of specimens.

Literature Cited

- COAN, EUGENE VICTOR
1973. The northwest American Semelidae. *The Veliger* 15 (4): 314 - 329; 2 pls.; 7 text figs. (1 April 1973)
- HABE, TADASHIGE & KIVOSHI ITO
1965. Shells of the world in colour 1: the northern Pacific. Osaka (Hoikushu), Japan xi+176 pp.; 56 pls.; 31 text figs.; 1 map

Table 1

Records of *Theora lubrica* from Southern California Waters

Location	Sampling Date	Sampling Device	Area of Sample (m ²)	Number Samples	Number Specimens	Range in No. Specimens per Sample	Mean No. Specimens per m ²	1 S. E.	Source of Data
Los Angeles Harbor East Basin Channel Slip 5	August 1973	Shipek Grab	0.042	9	39	0-7	105.7	±17.7	Marine Biological Consultants (1973)
Sunset Bay	October 1968 January 1969	Orange Peel Grab	0.051	10	6	0-4	11.8	± 7.8	HARDY (1970)
Sunset Bay	August 1972	Shipek Grab	0.042	24	4	0-2	4.0	± 2.7	Marine Biological Consultants (1972b)
Lower Newport Bay Main Channel	July 1971	Ekman- Birge Grab	0.038	3	363	-	1384.2	-	Seapy (herein)
Lower Newport Bay Main Channel	July 1973	Ekman- Birge Grab	0.038	13	3	0-1	6.1	± 3.2	Seapy (herein)
Lower Newport Bay Balboa Channel	September 1972	Shipek Grab	0.042	18	7	0-3	9.3	± 4.4	Marine Biological Consultants (1972a)

HARDY, ROBERT A.

1970. The marine environment of Upper Newport and Sunset Bays, Orange County, California. Resources Agency Calif. Dept. Fish & Game, MRR ref. no. 70-10; 84 pp. (August 1970)

MARINE BIOLOGICAL CONSULTANTS

1972a. Biological survey of Balboa Channel, Newport Harbor, Califor-

nia. Unpubl. Reprt. 44 pp.; 1 text fig.; 4 tables; 3 appendices (7 September 1972)

1972b. Baseline study of Huntington Harbor. Unpubl. Reprt., 73 pp.; 3 text figs.; 9 tables; 5 appendices (23 October 1972)

1973. Survey of the biota in Slip 5, Los Angeles Harbor. Unpubl. Reprt., 19 pp.; 2 text figs.; 4 tables; 1 appendix (23 August 1973)

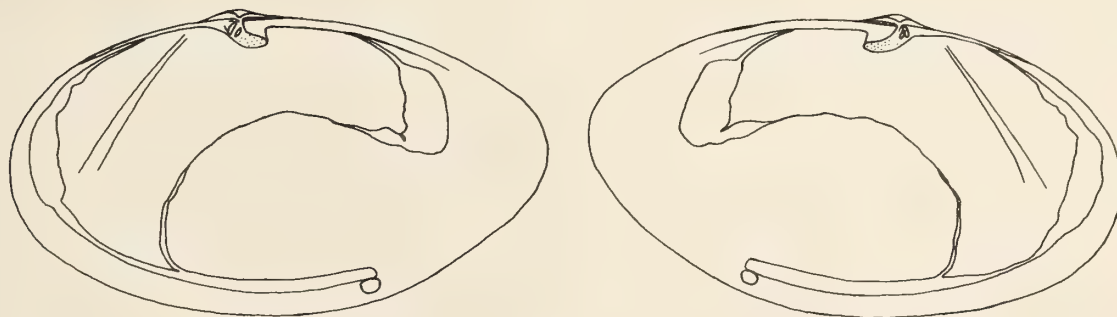


Figure 2

Internal view of the valves of *Theora lubrica*; 10.8mm